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HEWLETT-PACKARD COMPANY
Intellectual Property Administration
3404 E. Harmony Road
Mail Stop 35
FORT COLLINS, CO 80528

EXAMINER	
LIANG, LEONARD S	
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Please find below and/or attached an Office communication concerning this application or proceeding.

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JERRY.SHORMA@HP.COM
ipa.mail@hp.com
jessica.l.fusek@hp.com

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/789,744
Filing Date: February 27, 2004
Appellant(s): HO, WAI YUEN

Timothy B. Kang
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 06/09/09 appealing from the Office action mailed 02/09/09.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,097,189	ITO ET AL.	3-1992
3,780,652	BLACK ET AL.	12-1973
JP 2000104799	KUSHINO ET AL.	4-2000

Please note that KUSHINO ET AL. is referred to as MAKOTO OKADA et al. in the attached official translation. KUSHINO and OKADA are the two inventors.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 4-7, and 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al (US Pat 5097189) in view of Kushino et al (JP Pat 2000104799 A) and Black et al (US Pat 3780652).

Ito et al discloses:

- {claim 1} A carriage drive system (figure 1); a variable speed drive motor configured to propel a movable carriage along a slide rod, wherein the movable carriage supports print heads having an ink ejecting nozzle (figure 1, references 2, 3A, 3B, and 6; abstract; column 4, lines 44-54)
- {claim 7} A printer (figure 1); a movable carriage supporting print heads having an ink ejecting nozzle (figure 1, reference 2); a slide rod for supporting and guiding the movable carriage (figure 1, reference 3A, 3B); a variable speed drive motor configured to propel the movable carriage along the slide rod (figure 1, reference 6), wherein the variable speed drive motor is an electric motor (column 4, lines 49-50)
- {claim 14} A method of printing (figure 1); comprising activating a variable speed drive motor to propel a movable carriage along a slide rod, wherein the movable carriage supports print heads having an ink ejecting nozzle (figure 1; abstract; column 4, lines 44-54)

Ito et al differs from the claimed invention in that it does not disclose:

- {claim 1} a gearing mechanism, wherein the gearing mechanism has a first gear ratio resulting in a high carriage speed and a second gear ratio resulting in a low carriage speed and comprises a planetary gear assembly having: a sun gear driven by the drive motor; a ring gear; and a plurality of planet gears arranged between the sun gear and the ring gear, wherein, at the second gear ratio, the sun gear rotates and the ring

gear is configured to rotate at a slower angular velocity than the sun gear; and a centrifugal clutch operable to enable the gearing mechanism to switch between the first and second gear ratios automatically based upon an operational speed of the drive motor

- {claims 4 and 10} wherein operation of the drive motor at a high speed causes the centrifugal clutch to engage the ring gear causing the planet gears and the drive gear to be locked together such that they rotate as one with the sun gear resulting in a 1:1 gear ratio between the sun gear and the ring gear and operation of the drive motor at a low speed causes the centrifugal clutch to disengage the ring gear
- {claims 5 and 11} further comprising a speed calibration member for adjusting the gear ratio between the drive motor and the ring gear
- {claims 6 and 12} wherein the gear ratio between the drive motor and the ring gear is proportional to a friction force between the planet carrier and the speed calibration member
- {claim 7} a gearing mechanism having a first gear ratio resulting in a high carriage speed and a second gear ratio resulting in a low carriage speed, wherein the gearing mechanism comprises a planetary gear assembly having a sun gear driven by the drive motor; a ring gear; and a plurality of planet gears arranged between the sun gear and the ring gear, wherein, at the second gear ratio, the sun gear rotates and the ring gear is configured to rotate at a slower angular velocity than the sun gear; and a

centrifugal clutch operable to switch between the first and second gear ratios wherein the centrifugal clutch is an automatic two-way clutch, such that switching between the first and second gear ratios occurs automatically based upon an operational speed of the drive motor

- {claim 13} wherein the speed calibration member is manually adjustable
- {claim 14} activating a gearing mechanism wherein the gearing mechanism has a first gear ratio resulting in a high carriage speed and a second gear ratio resulting in a low carriage speed and comprising a planetary gear assembly having: a sun gear driven by the drive motor; a ring gear; and a plurality of planet gears arranged between the sun gear and the ring gear; wherein, at the second gear ratio, the sun gear rotates and the ring gear is configured to rotate at a slower angular velocity than the sun gear; and switching between the first and second gear ratio; wherein switching between the first and second gear ratio occurs automatically based on an operational speed of the drive motor
- {claim 15} wherein operation of the drive motor at a high speed causes the planet gears and the drive gear to lock together such that they rotate as one with the sun gear resulting in a 1:1 gear ratio between the sun gear and the ring gear

Kushino et al discloses:

- {claim 1} a gearing mechanism, wherein the gearing mechanism has a first gear ratio resulting in a high carriage speed and a second gear ratio

resulting in a low carriage speed and comprises a planetary gear assembly having: a sun gear driven by the drive motor; a ring gear; and a plurality of planet gears arranged between the sun gear and the ring gear, wherein, at the second gear ratio, the sun gear rotates and the ring gear is configured to rotate at a slower angular velocity than the sun gear; and a centrifugal clutch operable to enable the gearing mechanism to switch between the first and second gear ratios automatically based upon an operational speed of the drive motor (abstract; paragraph 0010-0011, 0015-0016)

- {claims 4 and 10} wherein operation of the drive motor at a high speed causes the centrifugal clutch to engage the ring gear causing the planet gears and the drive gear to be locked together such that they rotate as one with the sun gear resulting in a 1:1 gear ratio between the sun gear and the ring gear and operation of the drive motor at a low speed causes the centrifugal clutch to disengage the ring gear (abstract; paragraph 0010-0011, 0015-0016)
- {claims 5 and 11} further comprising a speed calibration member for adjusting the gear ratio between the drive motor and the ring gear (abstract; paragraph 0010-0011, 0015-0016)
- {claims 6 and 12} wherein the gear ratio between the drive motor and the ring gear is proportional to a friction force between the planet carrier and

the speed calibration member (abstract; paragraph 0010-0011, 0015-0016)

- {claim 7} a gearing mechanism having a first gear ratio resulting in a high carriage speed and a second gear ratio resulting in a low carriage speed, wherein the gearing mechanism comprises a planetary gear assembly having a sun gear driven by the drive motor; a ring gear; and a plurality of planet gears arranged between the sun gear and the ring gear, wherein, at the second gear ratio, the sun gear rotates and the ring gear is configured to rotate at a slower angular velocity than the sun gear; and a centrifugal clutch operable to switch between the first and second gear ratios wherein the centrifugal clutch is an automatic two-way clutch, such that switching between the first and second gear ratios occurs automatically based upon an operational speed of the drive motor (abstract; paragraph 0010-0011, 0015-0016)
- {claim 13} wherein the speed calibration member is manually adjustable (abstract; paragraph 0010-0011, 0015-0016)
- {claim 14} activating a gearing mechanism wherein the gearing mechanism has a first gear ratio resulting in a high carriage speed and a second gear ratio resulting in a low carriage speed and comprising a planetary gear assembly having: a sun gear driven by the drive motor; a ring gear; and a plurality of planet gears arranged between the sun gear and the ring gear; wherein, at the second gear ratio, the sun gear rotates

and the ring gear is configured to rotate at a slower angular velocity than the sun gear; and switching between the first and second gear ratio; wherein switching between the first and second gear ratio occurs automatically based on an operational speed of the drive motor (abstract; paragraph 0010-0011, 0015-0016)

- {claim 15} wherein operation of the drive motor at a high speed causes the planet gears and the drive gear to lock together such that they rotate as one with the sun gear resulting in a 1:1 gear ratio between the sun gear and the ring gear (abstract; paragraph 0010-0011, 0015-0016)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Kushino et al into the invention of Ito et al. The motivation for the skilled artisan in doing so is to gain the benefit of providing more reliable speed drive motor control and therefore more accurate printing via the dual speed gear/clutch arrangement. Also, the dual speed gear/clutch arrangement provides a mechanism that is easier on the electrical motor and therefore provides increased reliability of the motor. Even though Kushino et al does not disclose its gearing system in the context of driving a printer carriage, it does disclose a planetary gear system with a two way centrifugal clutch. It is known in the art to incorporate two way clutch systems into a printer driver system. As an illustrative example, Black et al discloses driving a printing system using a two way universal clutch (column 11, lines 11-24). Therefore the more advanced gear/clutch arrangement of Kushino would have been obvious for its defined advantages of increased motor control.

(10) Response to Argument

With respect to independent claims 1, 7, and 14, the Appellant argues: "In Fig. 2 of Kushino, where the sun gear 20 is driven by the input shaft 18, the centrifugal clutch 13 controls the ring gear 29 based on the speed of the output shaft 21. However, since the centrifugal clutch 13 controls the ring gear 29 based on the speed of the output shaft 21, Kushino fails to teach or suggest that gear ratios are switched based upon a speed of the input shaft 18, which drives the sun gear 20. Thus, Kushino fails to teach or suggest an automatic switching between first and second gear ratios based upon an operational speed of a drive motor, wherein a sun gear is driven by the drive motor, as claimed in independent claim 1."

The Examiner respectfully disagrees with this argument. The error in the Appellant's argument is that the Appellant has ignored the fundamental workings of a planetary gear assembly and as such, is attempting to improperly narrow the scope of the claimed invention and improperly concludes concludes that Kushino's disclosure therefore does not teach the missing limitation of the claimed invention is incorrect.

In any planetary gear assembly, there are three main components: 1) the sun gear, 2) the planet gears and the planet gears' carrier, and 3) the ring gear. Any of these three components can serve as the input, output, or can be held stationary. Depending on which components are chosen as the input and output, different gear ratios can be achieved. In some cases, the achieved gear ratio will be a reduction, which means that the output speed will be slower than the input speed. In other cases,

the achieved gear ratio will be an overdrive, where the output speed is faster than the input speed. In some cases, the gears will move together in one direction. In other cases, the gears will move in different directions. When two of the three components are locked together, the whole device will then operate at a 1:1 gear ratio. Locking the ring gear can be achieved by a centrifugal clutch. As an illustrative example, when the sun gear is the input and the ring gear is the output, there is a reduction where the output direction (of the ring gear) is reversed from the input direction (of the sun gear). However, when a clutch engages the ring gear and the output shaft, then the ring gear will rotate in the same direction as the input shaft. At this point, there will be a 1:1 gear ratio (as described in paragraph 11 of Kushino et al).

The Appellant makes the mistake of separating the motion of the input shaft from the motion of the output shaft. Both are integral parts of how the planetary gear mechanism in the claimed invention operates and any discussion of gear ratios will involve both the input and the output. While it is true that the speed of the output shaft affects the rotation of the ring gear, it is also true that the motion of the output shaft is directly controlled by the motion of the input shaft. If this were not the case, the planetary gear mechanism could not operate normally. It is the entire planetary gear mechanism (and not simply components of it), which enable the gear ratio change disclosed in the claimed invention. The centrifugal clutch kicks in and the gear ratio is changed as result of drive motor input; no drive motor input means no gear switching output. The drive motor, input shaft, output shaft, sun gear, and ring gear are all

components of an integrated planetary gear assembly and thus switching gears must always be a result of drive motor input either directly or indirectly.

The Appellant is narrowing the scope of the claimed invention by viewing the components individually rather than as part of an integrated whole. By doing this however, the Appellant destroys the fundamental operation of how a planetary gear assembly works. The claimed gear ratio switching simply cannot be achieved by an input alone. The fact that the ring gear is controlled by the motion of the output shaft is simply a description of how a planetary gear assembly works; it does not contradict the fact that the planetary gear assembly operates to switch between first and second gear ratios automatically based upon an operational speed of the drive motor through the use of a centrifugal clutch.

Next, the Appellant argues, "In addition, Black fails to teach or suggest ways to overcome the above-discussed deficiencies of Ito and Kushino." The Examiner notes that Black was cited simply as an illustrative example of clutches used in a printer context. Since the Appellant's arguments with respect to Ito and Kushino have been overcome above, the Appellant's arguments with respect to Black are rendered moot.

With respect to claims 4, 10, and 15, the Appellant argues, "However, in Fig. 2 of Kushino, by preventing the rotation of the ring gear 29 when the centrifugal clutch 13 engages the ring gear 29 at a high speed of the output shaft 21, a 1:1 gear ratio between the sun gear 20 and the ring gear 29 is not obtained in that, at a high speed, the sun gear 20 rotates in response to input shaft rotations but the ring gear 29 does not rotate due to the foregoing clutch engagement. Thus, Kushino fails to teach or suggest

that an operation of a drive motor at a high speed causes a centrifugal clutch to engage a ring gear causing planet gears and a drive gear to be locked together such that they rotate as one with the sun gear resulting in a 1:1 gear ratio between a sun gear and the ring gear, as discussed for claims 4, 10, and 15."

Here, the Appellant is again ignoring the normal operation of a planetary gear assembly. As mentioned above, a 1:1 gear ratio in a planetary gear assembly is achieved precisely when two of the three components (between the sun gear, planet gear and planet gears' carrier, and ring gear are locked). It is precisely when the centrifugal clutch engages the ring gear that the planet gears and the drive gear are locked together such that they rotate as one with the sun gear resulting in a 1:1 gear ratio between the sun gear and the ring gear. This is described in paragraph 0011 of Kushino where it is stated, "Next, when [the number of rotations] of the output shaft goes over the predetermined number of rotations, the clutch means connects the ring gear and the output shaft. Then, the ring gear rotates in the same direction as the input shaft, that is to say, the first rotational direction. Therefore, the two-way clutch allows the ring gear to rotate [in the direction] thereof. At this point, the speed reduction ratio will be represented as 1/1."

Next, the Appellant argues, "Black fails to teach or suggest ways to overcome the above-discussed deficiencies of Ito and Kushino." The Examiner notes that Black was cited simply as an illustrative example of clutches used in a printer context. Since the Appellant's arguments with respect to Ito and Kushino have been overcome above, the Appellant's arguments with respect to Black are rendered moot.

With respect to claims 5 and 11, the Appellant argues, "More specifically, Kushino discloses that, in Fig. 2, when rotations of the output shaft 21 exceed a predetermined value, 'a centrifugal clutch (13) prevents the rotation of the ring gear.' … However, in Fig. 2 of Kushino, such a prevention of the rotation of the ring gear 29 due to an engagement by the centrifugal clutch 29 at a high speed of the output shaft 21 does not teach or suggest an adjustment of a gear ratio between the input shaft 18 and the ring gear 29."

Here, the Appellant is again ignoring the normal operation of a planetary gear assembly. The prevention of the rotation of the ring gear due to an engagement by the centrifugal clutch is precisely the means used by the planetary gear assembly to adjust a gear ratio between the drive motor and the ring gear.

Next, the Appellant argues, "Black fails to teach or suggest ways to overcome the above-discussed deficiencies of Ito and Kushino." The Examiner notes that Black was cited simply as an illustrative example of clutches used in a printer context. Since the Appellant's arguments with respect to Ito and Kushino have been overcome above, the Appellant's arguments with respect to Black are rendered moot.

With respect to claims 6 and 12, the Appellant argues, "More specifically, Kushino discloses that, in Fig. 2, when rotations of the output shaft 21 exceed a predetermined value, a 'centrifugal clutch (13) prevents the rotation of the ring gear.' … However, in Fig. 2 of Kushino, such a prevention of the rotation of the ring gear 29 due to an engagement by the centrifugal clutch 29 at a high speed of the output shaft 21 does not teach or suggest that a gear ratio is proportional to a friction force."

Here, the Appellant is again ignoring the normal operation of a planetary gear assembly. As mentioned above, the drive motor, ring gear, and planet carrier are all connected and dependent on each other as an integrated whole. The planetary gear assembly operates normally when the centrifugal clutch prevents the rotation of the ring gear when rotations of the output shaft 21 exceed a predetermined value. Because of the direct relationship between the ring gear and the carrier, the gear ratio between the drive motor and the ring gear will be proportional to the friction force between a planet carrier and the speed calibration member.

Next, the Appellant argues, "Black fails to teach or suggest ways to overcome the above-discussed deficiencies of Ito and Kushino." The Examiner notes that Black was cited simply as an illustrative example of clutches used in a printer context. Since the Appellant's arguments with respect to Ito and Kushino have been overcome above, the Appellant's arguments with respect to Black are rendered moot.

With respect to claim 13, the Appellant argues, "More specifically, Kushino discloses that, in Fig. 2, when rotations of the output shaft 21 exceed a predetermined value, 'a centrifugal clutch (13) prevents the rotation of the ring gear.' … However, in Fig. 2 of Kushino, such a prevention of the rotation of the ring gear 29 due to an engagement by the centrifugal clutch 29 at a high speed of the output shaft 21 does not teach or suggest that a speed calibration member is manually adjustable."

Here, the Appellant is ignoring the context in which Kushino presents the planetary gear mechanism with the use of a centrifugal clutch, which is in the automatic transmission context. It is well known in that context, a speed calibration member is

manually adjustable; this happens when a driver changes gears. Although Kushino is being combined with Ito et al so that the planetary gear assembly of Kushino is to be used in the printer context, the manual adjustment of the speed calibration member remains. Manual adjustment of a speed calibration member for printing carriers is also well known in the printing art. The stepping motor of Ito et al itself is subject to manual adjustment based on the control needs of the user and the type of information input by the user. Therefore, since Ito et al and Kushino et al both disclose manual adjustment of their respective speed calibration members, Ito et al in view of Kushino et al discloses that the speed calibration member is manually adjustable. Furthermore, the Examiner would like to note that the phrase "manually adjustable" is itself broad, suggesting both pre-operation programming and in-operation control.

Next, the Appellant argues, "Black fails to teach or suggest ways to overcome the above-discussed deficiencies of Ito and Kushino." The Examiner notes that Black was cited simply as an illustrative example of clutches used in a printer context. Since the Appellant's arguments with respect to Ito and Kushino have been overcome above, the Appellant's arguments with respect to Black are rendered moot.

(11) Related Proceeding(s) Appendix

There are no related proceedings.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Leonard S Liang/
Examiner, Art Unit 2853
September 25, 2009

/Stephen D Meier/
Supervisory Patent Examiner, Art Unit 2853

Conferees:
/Stephen Meier/
Supervisory Patent Examiner, Art Unit 2853

/L. S. L./
Leonard S Liang, Examiner, Art Unit 2853

/David P. Porta/
Supervisory Patent Examiner, Art Unit 2884